

CLAIMS

What is claimed is:

1. A method of measuring formation properties, the method comprising:

obtaining a first response signal from a first transmitter-receiver array of antenna elements

having magnetic dipoles oriented parallel to a tool axis;

obtaining a second response signal from a second transmitter-receiver array of elements

having magnetic dipoles oriented perpendicular to the tool axis;

combining the first and second response signals to obtain a combination response signal

having enhanced vertical resolution.

2. The method of claim 1, wherein said combining includes:

performing a weighted summation of the first and second response signals, wherein the

ratio of the weight of the first response signal to the weight of the second response

signal is approximately minus three (-3).

3. The method of claim 2, wherein the weighted summation is performed in accordance with the following equation:

$$\text{Final Response} = a \times \text{VMD response} - b \times \text{HMD response},$$

where VMDresponse represents the first response signal, HMD response represents the second response signal, and a and b are optimization parameters.

1 4. The method of claim 1, wherein the first transmitter-receiver array has antenna element
2 placement substantially equal to antenna element placement of the second transmitter-receiver
3 array.

1 5. The method of claim 4, wherein the antenna elements of the first and second transmitter-receiver
2 arrays are appropriately-oriented coils of electrically-conductive material.

1 6. The method of claim 1, further comprising:
2 processing the combination response signal to determine a log of formation resistivity.

1 7. The method of claim 1, further comprising:
2 processing the first response signal to determine a first apparent formation conductivity;
3 processing the combination response signal to determine a second apparent formation
4 conductivity; and
5 combining the first and second apparent formation conductivities to determine a formation
6 anisotropy.

1 8. A logging system that comprises:
2 a multiaxial induction tool configured to provide signals indicative of a vertical magnetic
3 dipole (VMD) response and a horizontal magnetic dipole (HMD) response; and
4 a processor coupled to the multiaxial induction tool and configured to determine a
5 combined response from the VMD and HMD responses, wherein the combined
6 response has a substantially rectilinear vertical measurement profile.

1 9. The system of claim 8, wherein the processor determines the combined response as a weighted
2 sum of the VMD response and the HMD response, and wherein the relative weights of the VMD
3 and HMD responses are $3/2$ and $-1/2$, respectively.

1 10. The system of claim 8, wherein the processor is further configured to determine a resistivity log
2 of a formation from a combined response determined as the induction tool is moved through a
3 borehole.

1 11. The system of claim 8, wherein the multiaxial induction tool includes at least one transmitter
2 triad and at least two receiver triads.

1 12. The system of claim 8, wherein the processor is further configured to determine a formation
2 resistivity anisotropy from the combined response and the VMD response.